UNITED STATES DEPARTMENT OF AGRICULTURE
Agricultural Research Administration
Bureau of Entomology and Plant Quarantine

INSECT PEST SURVEY

Special Supplement (1949, No. 4) Issued June 1, 1949

ESTIMATED LOSSES CAUSED BY THE WHEAT STEM SAWFLY IN 1948

By E. G. Davis and Royce B. Knapp,
Division of Cereal and Forage Insect Investigations

A survey was conducted after harvest in 1948 in the northern Great Plains by the Bureau of Entomology and Plant Quarantine, in cooperation with the North Dakota Agricultural Experiment Station, to obtain definite information on the abundance and distribution of the wheat stem sawfly (Cephus cinctus Nort.) and on losses of wheat caused by this insect. The territory surveyed included all of Montana east of the Rocky Mountains, all of North Dakota, and the north-central part of South Dakota. That portion of the survey data dealing with the abundance and distribution of the sawfly has already been reported in Insect Pest Survey Special Supplement (1949, No. 3) issued February 21, 1949. The present report summarizes the data on wheat losses in Montana and North Dakota only, since infestations in South Dakota were of no consequence.

The survey was made by examining 10 well-distributed wheatfields in each county. Four samples, consisting of 25 wheat stems each, were examined in each field. The first sample was taken in the center of the first rod at the edge of the field; the second sample, in the center of the second and third rods; the third sample, in the center of the fourth, fifth, and sixth rods; and the fourth sample, in the center of the seventh, eighth, ninth, and tenth rods. The average percentage of infestation for each field was computed by weighting the percentage of infested stems in each sample with the number of rods each sample represented and dividing the sum by 10. In addition to the four samples of stems taken in each field, the unharvested wheat heads lying on the ground were also taken from 1 square foot at each of the four field locations from which the stem samples were taken. The number of fields sampled in Montana was 386, and the number sampled in North Dakota was 523.

The wheat stem sawfly reduces crop yields in two ways. It weakens the infested stems by tunneling extensively within them and thus causes a reduction in number and weight of kernels, and about harvesttime it cuts a ring around the inside of the infested stems just above the ground and thus causes them to break.

According to figures compiled by the Bureau of Agricultural Economics, 4,485,200 acres of wheat were harvested in the surveyed portion of Montana, and 9,518,000 acres in North Dakota. Of these acreages the sawfly survey showed that

17.4 percent, or 780,425 acres, were infested in Montana, and that 28.3 percent, or 2,693,594 acres, were infested in North Dakota. The yields from these acreages were 14,671,971 bushels for Montana and 38,518,394 bushels in North Dakota.

Losses in Yield Due to Tunneling of Stems

The infested fields in Montana had an average of 5.04 percent of the stems infested, and those in North Dakota 12.68 percent. It is therefore assumed that these percentages of the total yields in the infested areas of the two States were lower than they would have been if none of the stems had been tunneled by the sawfly. Investigations conducted by the North Dakota Agricultural Experiment Station[1/] have shown that the loss in weight of grain due to sawfly tunneling of the stems has ranged from 8.3 to 16.8 percent. The average of these two figures gives the loss in yield due to tunneling as 12.55 percent of 5.04 percent, or 0.63 percent of the total yield, in the infested portion of Montana; and 12.55 percent of 12.68 percent, or 1.59 percent of the total yield, in the infested portion of North Dakota. The yields of 14,671,971 bushels from the Montana area and of 38,518,394 bushels from North Dakota thus represent 99.37 and 98.41 percent of what the yields would have been in those areas if none of the stems had been tunneled. It is therefore estimated that in the absence of sawfly tunneling the yields would have been 14,764,990 bushels in the Montana area; and 39,140,732 bushels in North Dakota, and that the losses in yield due to the tunneling of the larvae in the stems were approximately 93,019 bushels in Montana, and 622,338 bushels in North Dakota, or a total of 715,357 bushels for the two States.

Losses in Yield Due to Cutting of Stems

The weights of grain from the square-foot samples of fallen heads from infested fields and from noninfested fields were determined separately. From these weights the losses due to fallen heads were computed in terms of bushels per acre. For Montana these were 1.23 bushels in infested fields and 0.61 bushel in noninfested fields, and for North Dakota, 0.91 bushel in infested fields and 0.18 bushel in noninfested fields. Losses due to sawfly cutting were thus estimated to be 0.62 bushel per acre in Montana and 0.73 bushel in North Dakota. Although the loss for infested fields in Montana was greater than in North Dakota, the loss in noninfested fields (normal harvesting loss) was also greater in Montana. The greater harvesting loss in uninfested fields in Montana was probably due to the straight combine harvesting generally practiced in that area, a method by which few fallen heads are recovered as compared with those recovered by windrowing the wheat promptly and threshing it from the windrow generally, the practice followed in North Dakota.

A loss of 0.62 bushel per acre on 780,425 infested acres in Montana amounts to 483,864 bushels, and a loss of 0.73 bushel per acre on 2,693,594 infested acres in North Dakota amounts to 1,966,324 bushels, or a total loss of 2,450,188 bushels in

---

[1/] North Dakota Agricultural Experiment Station Bimonthly Bulletin 10 (2): 46-51, 1947; 11 (3): 85-91, 1949.

the two States due to sawfly cutting. These losses probably would have been greater had it not been for the unusually favorable harvesttime weather which made it possible to harvest much of the crop before a very large proportion of the infested stems had fallen to the ground.

Summary

According to estimates based on a post-harvest survey, the losses of wheat in 1948 due to grain shrinkage caused by the tunneling of sawfly larvae in wheat stems were approximately 93,000 bushels in Montana and 622,000 bushels in North Dakota. The losses caused by the breaking over of sawfly-cut wheat stems were approximately 484,000 bushels in Montana and 1,966,000 bushels in North Dakota. The losses caused by the sawfly in 1948, included both grain shrinkage and broken-over stems, are thus estimated to be about 577,000 bushels of wheat in Montana and 2,588,000 bushels in North Dakota.